LabSpiegel [LabMirror]

[Shaded box:]
"We got it!"
KSLA team winner of Amsterdam Company Firefighting Day

Nanoflow reactor now in sextuple version!

In the basement of the New Lab, colleagues from the CGP and CRD departments put a multitube reactor into operation last month that will be used in catalyst research in the CRD department. The device is a sextuple version of the nanoflow reactor discussed previously in LabSpiegel and was developed within KSLA in fourteen months' time. Each of the six reactors is smaller by a factor of ten to thirty than the microflow reactors that are normally used in catalyst research.

Although the transfer and putting into operation have yet to take place officially, there is great appreciation on the part of the CGP and CRD employees for the skill of IDC and various SE departments. Almost all the technical sections, Construction, QMI, Electronics, Instrumentation, Mechanical Workshop, contributed to solving problems and then to the manufacture of the equipment. A splendid example of what the SE people are capable of is the part that connects all six reactors to the six inlet lines with a single nut: six line seals, each of which can withstand a pressure of 100 bar! It was a meticulous job, which resulted in a device the size of a lab table – one that previously filled half a lab room.

A year after the introduction of the nanoflow reactor, this means another important step forward in experimental process and catalyst research, in the sense of effectiveness, safety and mobility.

(More information on page 4)

[Cartoon:]
LS asks for confirmation of the succession of the Managing Director (LS 800)
...I was just with him last month...
With **WHOM** again?

During the Amsterdam Company Firefighting Day on Saturday, September 10th, the KSLA fire team claimed first place with a great show of strength. The five-man crew, captained by Henny Overdijk, far outpaced teams from companies such as IBM, AKZO, GAK and Duphar by scoring 25% higher in the final point count than the other participants, who all ended close together.

The teams collected these points in seven locations, which were visited one by one on the property of the participating Amsterdam companies during that Saturday. t those locations, they received various tasks to perform. t Duphar, technical help was expected in the form of sealing a large tank "which had hydrochloric acid leaking out of it." At IBM, they worked with foam and on their own KSLA property, they had to save a missing person from a burning room full of smoke.

Although the fire team from KSLA was well trained, there were still a number of surprises in the air this day. At AKZO, for example, they were asked to use a spray bullet on an oil fire. Nice task, but no one on the team had ever had one in his hands before...
The theoretical part took everyone back in their thoughts to their school days. They were sweating again!

After a day of rigorous work, the prize-giving ceremony finally had everyone beat. The KSLA team not only took first place by a large margin, but also turned out to have the best captain. Henny Overdijk proudly received his award.

New multitube reactor - scaling down gains ground

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Not even a year later, as a result of this development, and embroidering on the positive experience with this nanoflow reactor in the meantime, a multiple version was developed and constructed. This will be deployed for catalyst research in the CRD department and has been given the splendid name of multitube reactor. The basis of the device is fairly simple. A number of gases are mixed into the desired reactant[2], which is then distributed across six inlet lines which are connected to one of the six reactors. With this, it is possible to test six catalysts simultaneously in one experiment.

The problem in building the device was not the number of reactors, however, but the scale on which everything had to be made. The reactor tubes themselves contain in the

experiment between 25 and 250 milligrams of catalyst, which means that all lines, valves, etc. are made with a feed-through of only several tenths of a millimeter.

As was already expressed in the introduction, SE had an especially large amount of work here, not only in manufacturing certain parts but, before that, thinking up feasible solutions to certain problems. The connection of the inlet lines to the reactors was implemented in a form which is comparable to the valve closure in a diesel engine. The part can be connected with a single nut, after which a spring package guarantees a seal up to 100 bar. The six reactor tubes are linked in a silver block (heat conduction!) of about five kilos, in which the heating and the thermocouples are also located. At the bottom, the block has a number of plug feet which can be coupled in one movement to the "socket" below. Thus the heating is connected and measuring points (the thermocouples) are also connected.

Isn't a silver block like that very expensive, we ask the "users," Jo Glezer and Carl Mester. *"It's not as bad as you might expect,"* is the laconic answer, *"the system is cheaper than an alternate system made of stainless steel! But it has a limitation for us. At 900°C, it begins to soften so that, with our experiments, we only dare to go to about 700°C."*

The discharge flows (little flows) from the six reactors are continuously subjected to analysis during the process. That yields a lot of data that entails a lot of work for the researchers. In order to ensure that we can see the forest despite the trees, the computer calculates from that mass of numbers a single base figure that tells the researchers something about the catalyst. Glezer: *"Also, as far as control is concerned, we went a step further. It takes place with the aid of an advanced computer. Every half minute, it performs a measurement at 34 points in the device. The actual regulation of those points happens every second and a half. With that, we therefore have available more safety levels than before. And while we're talking about safety, I just want to show you the flow limiters which have been installed in all the gas inlet lines."* We are shown a box with a small round plate in it with a diameter of about seven millimeters. At first glance, it is nothing special, only small and insignificant. The plate appears to be a diamond wafer, thus, rock-hard. In the middle, a conical (!) hole of 0.015 mm has been drilled with a laser beam that limits the gas flow to a completely harmless leakage flow, if a leak should occur somewhere in the device because of, for example, a crack. And, since the mobile test setup is "adorned" with no fewer than seven gas cylinders, this is not an exorbitant luxury.

Coming back to the computer, it appears that it has some interesting possibilities available. Not only is the device mobile, the person working with it has also been given more

freedom of movement. After connecting to the Shell broadband network, the operator can look into the reactor via the computer, as it were, from his desk or from home. And since the device can continue outside official working hours, that means that the effectiveness is increased by a factor of three.

Then what is the situation with computer hackers that the government and media have their hands full of these days?

"Not a very big problem," according to Mesters. *"If they figure out how to get in, they still have no notion of what it's all about. Furthermore, it doesn't say anywhere which catalyst it concerns, so they still don't learn anything."*

If they're working in the gas phase, such as in this experiment, then everything goes as it should. With sensitive analysis methods, such as mass spectrometry, no more than 10^{-10} Mol per analysis is necessary. In analysis of liquid samples with other methods, a multiple of that will be necessary, although in many more modern analysis techniques less than a gram of sample can suffice.

How about representativeness in general with this scaling down, for that matter? From microflow to bench scale it is already a big step, and the results at nanoflow level can't be translated just like that to microflow level, can they?

Glezer: *"First you must understand that we put in the nanoflow, and now the multitube, reactor in the first place for catalyst screening, in which direct process simulation is not yet under discussion. If you're going to convert something to a higher level, then you have to be on the alert. But we have good expectations for that. The step from microflow to bench scale and after that to pilot plant is all known. Now we're working on the translation of nanoflow to microflow. For that matter, it doesn't appear to cause any problems in the gas phase, but it will soon be very interesting for us when we talk about the liquid phase."*

Carl Mesters also tries to express that again clearly: *"Look, after the first screening, you're going to test a catalyst that comes out well on a larger scale, but even that is not yet a direct process imitation. Take the testing of fuels as an example. For that, an engine block on a stand is sufficient. You don't need a complete car!"*

From the conversation that then develops, it appears that catalyst research in CRD is aimed at the development of NO_x catchers.

Mesters: *"In Germany, coal-fired power plants are already required to catch nitrogen oxides and Ed Nijpels has already shown himself to be a proponent of that in our country. That is a requirement which we must thoroughly take into account."*

How does the future of this small work look?

Glezer: *"Data translation to larger installations is still crucial -- minimizing the analysis equipment. With liquids, we'll have our work cut out for us with some analyses, I think. And what would be very interesting for us would be if we were able, in this device, to feed the analysis results back into the control computer. It could then, for example, raise the temperature when the quality of the catalyst decreases, so you could get a constant end product."*

So -- a process simulation after all?

Mesters: *"Yes, but then more in research in a department like HCP, which has also ordered a multitube reactor. In CRD, in the first instance, we'll keep testing catalysts, and now also on nanoscale!"*

COR [Central Employees' Council] consultation meeting

On Wednesday, last September 14th, the COR met in a consultation meeting with the Director of Shell Nederland BV, Doctorandus H. Hooykaas. An important subject for this meeting was the approval request concerning the reduction of working hours for the period 1989-1991. Other subjects that came up for discussion were Handicapped Employees Labor Act and the handling of personnel data in the framework of the Registration of Persons Act.

Approval request
Reduction of working hours
1989-1991

Shell Nederland asked the COR to approve the proposal to continue the present arrangement for reduction of working hours (ADV) in unchanged form for a period of three years, i.e. from 1 January 1989 through 31 December 1991. The COR extensively discussed this proposal internally in the COR meeting of last August 31st. After that, the Organizational Structure Committee again spoke with Shell Nederland about the proposed decision, after which the consultation with the Director took place on September 14th. In this consultation, the COR indicated that it was having great difficulty with granting approval for a period of three years.

The COR found an annually recurring consultation, in which possible changes in society with respect to ADV could be included, more desirable.

The Director again stated that the intention of the period of three years was to create clarity for the employees, which would cause a degree of calm at the various locations. The Director observed that there was no difference of opinion with the COR concerning the principle of the present arrangement, as we have known it for several years. The Director was sympathetic to the fact that the COR was having difficulty with establishing the volume for a period longer than a year. He was therefore prepared, as far as the volume was concerned, to reduce the period of the approval request to one year.

After that, the COR unanimously decided in an internal meeting to grant the requested approval for the year 1989.

Handicapped Employees Labor Act (WAGW)

The Handicapped Employees Labor Act (WAGW) is expected to go into effect in July 1989. On the basis of this act, employers will be required to take certain measures and make arrangements. Mr. I. J. van Vliet, of Shell Nederland's PSPS Department, explained in this consultation meeting what consequences can be expected from implementation for the Shell companies in The Netherlands. He began by indicating that the measures in the framework of the WAGW will be a part of the social policy and will not lead to the development of a separate handicapped policy. On the one hand, the company policy will be preventive in nature to prevent the occurrence of disability. On the other hand, possibilities will be looked at to relocate partially disabled employees within the company and to incorporate partially disabled employees into the labor process. SN is of the opinion that its policy satisfies the requirements of this act. This subject will come up for further discussion via the COR/committee consultation with Shell Nederland.

Personnel data in the framework of the Registration of Persons Act

Ms. A. M. Peeman, of Shell Nederland's PSCI Department, provided an introduction within the framework of the Registration of Persons Act. The purpose of this introduction was a progress report with respect to the activities in Shell companies with regard to gathering, storing and using personnel data. Before the end of the year, all Shell employees will receive a booklet

with information about the new law. They will also receive a statement of the basic data which are stored. Employees can then have any errors corrected.